How and When are High-Frequency Stock Returns Predictable

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This paper studies the predictability of ultra high-frequency stock returns and durations to relevant price, volume and transactions events, using machine learning methods. We find that, contrary to low frequency and long horizon returns, where predictability is rare and inconsistent, predictability in high frequency returns and durations is large, systematic and pervasive over short horizons. We identify the relevant predictors constructed from trades and quotes data and examine what determines the variation in predictability across different stock's own characteristics and market environments. Next, we compute how the predictability improves with the timeliness of the data on a scale of milliseconds, providing a valuation of each millisecond gained. Finally, we simulate the impact of getting an (imperfect) peek at the incoming order flow, a look ahead ability that is often attributed to the fastest high frequency traders, in terms of improving the predictability of the following returns and durations.